Air Resources Board

Robert F. Sawyer, Ph.D., Chair
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

August 15, 2006

Mr. Philip Tam
Research & Development Engineer
PACECO Corporation
25503 Whitesell Street
Hayward, California 94545

Dear Mr. Tam:

The Air Resources Board (ARB) has reviewed the PACECO Corporation application for the verification of the Mitsui Engineering and Shipbuilding - diesel particulate filter (MES-DPF). Based on the evaluation of the data provided, ARB hereby verifies that the MES-DPF reduces emissions of diesel particulate matter (PM) by 25 percent or greater (Level 1) for use with nonroad diesel engines on rubber-tire gantry cranes with a rated power of 225 kW to 450 kW manufactured before 1996 or certified to Tier 1, 2 or 3 PM (as tested on an appropriate steady-state certification cycle ISO 8178 D2). The MES-DPF is therefore verified as a Level 1 diesel emission control device for constant speed nonroad diesel engines on rubber-tire gantry cranes with a rated power of 225 kW to 450 kW manufactured before 1996 or certified to Tier 1, 2, or 3 PM, subject to the terms and conditions specified below. This verification is valid provided the operating conditions specified in Table 1 are met.

Since there may be significant variations from application to application, PACECO Corporation must review actual operating conditions (duty cycle, baseline emissions, exhaust temperature profiles, and engine backpressure) prior to retrofitting an engine with a MES-DPF to ensure compatibility.

Furthermore, the engine should be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer. PACECO Corporation must install the Danfoss backpressure monitor on all engines retrofitted with a MES-DPF.

Table 1: Conditions for the MES-DPF

Parameter	Value
Application	Rubber-Tire Gantry Cranes
Engine Type	Diesel, with or without turbocharger, constant speed, with a rated power of 225 kW to 450 kW
Minimum Exhaust Temperature for Filter Regeneration	The engine must operate at a load level required to achieve an exhaust temperature of 250^{o}C or greater for at least 50% of the time. Operation at lower temperatures is allowed, but only for the limited duration specified below.
Maximum Consecutive Minutes Operating Below Passive Regeneration Temperature	120 Minutes
Maximum Exhaust Temperature	550 ^{o}C
Number of Hours of Operation Before Cleaning or Replacement of Filter Required	2,800 hours (or 1 year), whichever occurs first
Number of Hours of Operation Before Replacement of Catalyst Required	14,000 hours (or 5 years), whichever occurs first
Fuel	California diesel fuel with less than or equal to 15 ppm sulfur or a biodiesel blend provided that the biodiesel portion of the blend complies with ASTM D6571 (15 ppm sulfur), the diesel portion of the blend complies with Title 13 (CCR), sections 2281 and 2282 and the blend contains no more than 20 percent biodiesel by volume.
Verification Level	Level 1 Verification: At least 25% reduction of PM.

Verification of the MES-DPF will be revoked following the implementation of the NO_2 increase limit of 20% of baseline NO_x by mass on January 1, 2009 due to the significant increase in NO_2 emissions (20.7%) with the device in place unless further data is provided. Documentation must be submitted to the ARB demonstrating the increase in NO_2 is less than 20% of baseline NO_x by mass before January 1, 2009 for this verification to be valid after that date (see equation below).

$$[((NO_2)_{\text{pre-conditioned DPF}} - (NO_2)_{\text{baseline}}) + ((NO_2)_{\text{aged DPF}} - (NO_2)_{\text{baseline}})]/(NO_x)_{\text{baseline}} * 0.5 * 100\% = 20\%$$

For in-use compliance testing, the increase in NO_2 should be calculated as follows:

$$\text{Percent Increase} = [(NO_2)_{DPF} - (NO_2)_{baseline}]/(NO_x)_{baseline} * 100\%$$

ARB hereby assigns the MES-DPF the designated family name of:

CA/PAC/2006/PM1/N00/OF/DPF01

This identification number should be used in reference to this verification as part of the system labeling requirement.

Additionally, as stated in the Diesel Emission Control Strategy Verification Procedure, PACECO Corporation is responsible for honoring their warranty (California Code of Regulations, Title 13, Section 2707) and conducting in-use compliance testing (California Code of Regulations, Title 13, Section 2709).

Enclosed is Executive Order G-06-044 granting Level 1 verification of the MES-DPF.

Should you have any questions or comments, please contact Ms. Kathleen Truesdell, Air Resources Engineer, at (916) 327-5638.

Sincerely,

/s/

Daniel E. Donohoue, Chief
Emission Assessment Branch
Stationary Source Division

Enclosure

cc: Kathleen Truesdell
Air Resources Engineer
Technical Analysis Section
Stationary Source Division